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ABSTRACT

Critical and situated thinking in the respiratory care profession were examined through an exploratory factor analysis of the critical thinking behaviors of a sample of 868 respiratory therapists. The respiratory therapists completed a survey instrument containing 44-questions related to how well particular critical thinking behaviors are performed. The questions sought information on the following seven factors involved in critical thinking: prioritizing, anticipating, troubleshooting, communication, decision making, negotiating, and reflecting. The factor analysis established that these seven factors could be narrowed into two broad factors--situated problem solving and communication skills. Analysis of the responses established that the respiratory therapists could be considered to be of three types as follows: (1) individuals called Type 1, with high situated problem-solving skills and high communication skills (377 respondents); (2) individuals called type 2, with low situated problem-solving skills and low communication skills (252 respondents); and (3) individuals called Type 3, with high situated problem-solving skills and low communication skills (239 respondents). The type 1 respiratory therapists tended to work in hospitals, be female, and have more experience in their profession. The type 2 respiratory therapists were mainly female, but being a type 2 thinker was not strongly related to years of experience in the profession. The type 3 respiratory therapists tended to be male, work in hospitals, and possibly be socially isolated. (14 references) (MN)

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The Deep Structure of Situated Thinking in Professionals

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Abstract: This study explicates Critical Thinking (CT) in the respiratory care profession. An exploratory factor analysis was performed and seven measured CT behaviors were narrowed to two factors. A cluster analysis followed and three groups of practitioners were found. This empirical typology considerably expands the conception of CT in the professions.

Introduction

The theory of critical thinking (CT) has evolved into a multi-faceted body of knowledge concerned with the applications, measurement, and teaching of highly integrated, dialectical thought (Bleedorn, 1993). Situated cognition maintains that learning is rooted in the situation or environment in which a person interacts or participates (Fenwick, 2000). From these two perspectives, knowledge and learning are structured with the setting in which they occur. In the practice of respiratory care, a respiratory therapist (RT) renders services to patients with deficiencies or abnormalities that affect the pulmonary and cardiac systems of the human body. CT and clinical decisions regarding therapy, management, rehabilitation, diagnostic evaluation, education, and care of such patients are required. However, the caliber of these medical decisions is influenced by the clinical situation and may enhance or limit opportunities to improve the quality of life.

In the profession of respiratory care, we need a more basic, more elegant understanding of critical and situated thinking to allow us to further describe CT in the profession of respiratory care. This study represents an attempt to appreciate the true nature (or the deep structure) of situated thinking by understanding the differences, if any, in the dimensions identified as CT and provide theoretical clarity by adding to the empirical base developed thus far in the profession of respiratory care.

Background

Mishoe's (1995) research identified the CT skills and traits of expert registered respiratory therapists (RRTs) working in acute care settings in hospitals. She determined that CT in respiratory care involves the abilities to prioritize, anticipate, troubleshoot, communicate, negotiate, reflect, and make decisions. Mishoe (1996) further reports that the work context and the role of the organization, including managers, must be addressed when attempting to explain or facilitate critical thinking in respiratory care practice. These CT skills and attitudes can be shown to overlay the ways of knowing described in the expert practice of nurses (Benner, 1984; Benner & Tanner, 1987; & Benner, Hooper-Kyriakidis, & Stannard, 1999), to the nature of medical expertise of physicians (Patel & Groen, 1991), and the clinical practice themes in physical therapy practice (Jensen, Gwyer, Jack & Shaped, 1999).

Purpose Of Research

This study attempts to explain critical and situated thinking in the respiratory care profession more fully by identifying and describing characteristics or dimensions of RTs in a more meaningful and theoretical way. In order to accomplish that broad purpose, two objectives were undertaken: (a) to discover the empirical dimensions underlying the seven
CT skills based on patterns of assessments of CT behaviors, and (b) to describe the identified subgroups in terms of available personal variables or in other words, how does the respiratory therapy population

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array itself? There is a need to know how these forces manifest themselves among a population of potential learners, not only those who are RTs, but for other professionals engaging in life-long learning in their practice.

Methodology

The theoretical foundation of this study was based on the research of Mishoe (1995). The present study centered on a previous inquiry into the critical thinking behaviors of respiratory therapists (Goodfellow, 2001); the database employed in that study was also used here. In the previous study, a survey instrument was developed around operant constructs of the seven critical thinking skills in respiratory care. The instrument consisted of forty-four questions relating to "how well" a particular critical thinking behavior was performed. Each question was scored from a Likert six-point scale where 1 = not well, 2 = fairly well, 3 = somewhat well, 4 = quite well, 5= very well, and 6 = extremely well. Content and construct validity were established via an expert panel, a modified Q sort, and analysis of the results of a pilot study. The coefficient alphas for each construct ranged from .80 to .90 with an overall alpha for the instrument of 0.94.

Goodfellow (1999, 2001) assessed critical thinking behaviors through self-report. Respiratory therapists rated themselves on the seven critical thinking skills identified by Mishoe (1995). The results indicated that respiratory therapists self-assess their critical thinking behaviors in the following rank order: prioritizing, troubleshooting, communicating, reflecting, decision-making, negotiating, and anticipating. Age and educational level were found to have no effect on the self-assessed behaviors while years of experience in respiratory care and gender were found to effect the self-assessed critical thinking behaviors of troubleshooting, decision making, and anticipating. Implications from this study suggested that more research was needed to determine whether all the critical thinking skills or behaviors investigated are able to stand alone, or are there individuals manifestations of critical thinking based on the practice of respiratory care.

Data Analysis of the Present Study

The data from the original study were employed in the current analysis. An exploratory factor analysis was performed to extract group variables in answering the first research question. Factor analysis is a popular strategy in the behavioral sciences for reducing the number of variables or constructs from multiple related independent variables into a few underlying factors (Katz, 1999). Both orthogonal and oblique rotations were examined using SPSS version 9. Using the Varimax procedure and avoiding multicollinearity, standardized scores were computed for each case using the complete estimation method (Kim, 1975). Solutions ranging from 2 to 5 factors were examined to obtain the simplest possible factor structure.

A cluster analysis followed the grouped observations in the second research question. The sample was segmented into distinct subgroups based upon patterns of similarities and dissimilarities with respect to factor scores. From the factors determined in the first objective, a non-hierarchical disjointed cluster procedure was used where each individual is placed in one and only one cluster. Two to 7 clusters were examined for parsimony of theory and ultimately a clearer structure emerged which lead to conceptually clarity. These clusters were subsequently used in correlational analyses to explore the relationships between respondent personal variables of gender, age, educational level, practice setting, and experience level.

Results

Factor Analysis

Due to the fact that factor analysis is based on the correlation matrix, we first reviewed the correlations of all seven constructs. Table 1 provides this information and due to the overlap seen by this investigation, it is difficult to ascertain any meaningful information.

Table 1. Intercorrelations Among the Seven Critical Thinking Constructs (n = 975)

	R	N	DM	C	T	A
P	r = .67 r^2 = .45 n = 946	r = .63 r^2 = .40 n = 941	r = .77 **r^2 = .59** n = 928	r = .59 r^2 = .35 n = 935	r = .66 r^2 = .44 n = 935	r = .72 **r^2 = .52** n = 916
A	r = .74 **r^2 = .55** n = 918	r = .70 r^2 = .49 n = 913	r = .79 **r^2 = .62** n = 902	r = .66 r^2 = .44 n = 919	r = .79 **r^2 = .62** n = 916	
T	r = .68 r^2 = .46 n = 935	r = .71 **r^2 = .50** n = 936	r = .79 **r^2 = .62** n = 921	r = .62 r^2 = .38 n = 939		
C	r = .67 r^2 = .45 n = 938	r = .75 **r^2 = .56** **n** = 936	r = .67 r^2 = .45 n = 920			
DM	r = .75 **r^2 = .56** n = 930	r = .73 **r^2 = .53** **n** = 925				
N	r = .71 **r^2 = .50** n = 941					

Correlations are significant at the 0.01 level (2-tailed). All coefficients are significant.
P = Prioritizing; A = Anticipating; T = Troubleshooting; C = Communication; DM = Decision Making; N = Negotiating; R = Reflecting

The next step was an exploratory factor analysis. All seven critical thinking constructs were examined by principal components analysis. For a more parsimonious solution, a .60 or greater loading criterion was used to define a given factor. After inspection of the rotated factor matrices (Varimax with Kaiser normalization), the 7 constructs were narrowed to a 2-factor solution to conceptually represent the data. Table 2 present the constructs with the factor loadings, item means, scale reliability scores and self-assessed critical thinking behaviors ranking. A perfect simple structure was achieved with each construct loading on one and only one factor.

Table 3 illustrates the total variance explained from this factor analysis. We could explain Critical thinking in respiratory care as being a one factor unitary construct with 75% of the variance explained. However, this is not very informative. By viewing critical thinking in respiratory care by a two-factor model, approximately 82% of the variance is accounted for and two factors are more conceptually meaningful.

Interpretation of Factors

Factor 1. The constructs with substantial loadings on this factor consisted of the critical thinking skills involving Prioritizing, Troubleshooting, Decision Making, Reflecting, and Anticipating. Implicit in this grouping of constructs were

Table 2. Variable Loadings, Item Means, Scale Reliability, and Self-Assessed Critical Thinking Behaviors

Variable	Loading Factor Component 1	Loading Factor Component 2	Item Mean	Scale Reliability	Self-Assessed Ranking
Prioritizing	.843	.281	4.84	0.90	1
Decision Making	.821	.430	4.58	0.82	5
Anticipating	.788	.445	4.38	0.80	7
Troubleshooting	.766	.434	4.77	0.87	2
Reflecting	.650	.574	4.60	0.81	4
Communication	.328	.887	4.68	0.84	3
Negotiating	.471	.791	4.46	0.88	6

n = 868

Table 3. Total Variance Explained by Principal Component Analysis.

Component	Initial Eigenvalues	Cumulative %
1	5.23	74.64
2	0.51	81.93
3	0.35	86.92
4	0.30	91.20
5	0.24	94.70
6	0.20	97.45
7	0.18	100.00

connotations of problem solving, professional growth, mental rehearsing, crisis situations, changes and time constraints. The constructs of this Factor are "Intrapersonal" (or individual) skills used in the professional practice of respiratory care that are dependent on the situation or context in which respiratory therapists find themselves. "Situated Problem Solvers" seems an appropriate label for Factor 1.

Successful problem solvers are able to focus on a clinical problem i.e., notice a deteriorating patient trend during the previous shift, ultimately define the problem by examining relevant data, which leads to picking an acceptable action to take in the decision making process. Through this process of clinical inquiry, these respiratory therapists problem search and problem identify, both formally and informally, to extend their clinical understanding, which can result in new clinical knowledge.

Factor 2. The two remaining constructs correlating highly with the second factor are Communicating and Negotiating. Communicating as a critical thinking skill in respiratory care

encompasses the ability to gather appropriate and sufficient information to analyze, evaluate, and make judgments in clinical practice. This is dependent upon working relationships with others. Negotiating differs from communicating because the intent is to impart information and ask questions in an effort to influence others' decisions and actions. This also is dependent on working relationships with others. Consequently, "Skilled Communicator" seems an appropriate label for Factor 2.

If a respiratory therapist is not able to effectively communicate, he or she will not be able to think critically during a given situation. Respiratory therapists obtain the communication skills that are not only practitioner specific, but also situation specific. Further, Negotiating is communication with the intent to influence others. The skilled communicator uses their critical thinking ability in argumentative reasoning and articulates their difference of opinion while appreciating multiple perspectives, focusing only on the evidence and the need to keep out personal biases. For example, when respiratory therapists communicate with physicians, in most situations, is more than the sharing of information. The power relationship of respiratory therapist and physician must be included to fully understand the communication process. Physicians have full responsibility for the care of his/her patient. This is a power base that physicians share with other healthcare professionals. Due to the expertise of physicians and the expertise of respiratory therapists, communicating is more a concept of negotiating. The outcome is collaboration of patient care and an interdependence that is nurtured.

Cluster Analysis

The factor scores were next used to create clusters (or multiple solutions) of the participants in the sample. These clusters are defined in relation to one another rather than with respect to any absolute, external criteria (Valentine & Darkenwald, 1990). Table 4 defines the respiratory therapists by their scores on the three clusters of critical thinking. Further, from the background or personal variables investigated in the earlier study (Goodfellow, 1999, 2001), i.e., gender, age, educational level, years of experience, working setting and organizational climate, we wanted to determine which of these mattered. ANOVA calculations found organizational climate, work setting, age, and education level not significant, but gender and years of experience revealed significance of $p = 0.001$ (gender) and $n = 865$, $df = 2$, $F = 4.019$, $p = 0.018$ (years of experience).

Table 4. Three Clusters of Respiratory Therapists as Defined by their Scores on the Two Factors of Critical Thinking in Respiratory Care.

		Factors	
Cluster	n of Sample/ % of sample	Situated Problem Solver	Skilled Communicator
I	377/(43.4%)	high	high
II	252/(29.0%)	low	low
III	239/(27.6%)	high	low

Discussion

Taken together, the correlational investigation, the factor analysis, and the cluster analysis, this investigation represents an empirically based typology of respiratory therapists with respect to critical thinking in respiratory care. The following description of the three types, or clusters, focus only on those variables that distinguish each cluster from the other two clusters and from the group as a whole.

Type One

The 377 respondents found in this cluster rate themselves high in situated problem solving and in skilled communication. Type one respiratory therapists tend to work in hospitals, be female, and are more experienced in their profession. Their clinical judgments are applied in situations where skilled communication is necessary for effective patient care and appropriate use of resources.

Type Two

The 252 respondents in this cluster rate themselves low in situated problem solving and low in skilled communication. The data suggests that these individuals are employed in work settings that are not hospital–based, but are in home health care, asthma clinics, physician offices and other out-patient venues. Further, these respiratory therapists are mainly female. Experience level and the influence of experience on the data are difficult to understand given the weak relationship found between the type two cluster and years of experience.

Type Three

The 239 respondents in this cluster rate themselves high in situated problem solving and low in skilled communication. This cluster is majority male, work in hospitals, and perhaps is socially isolated. These respiratory therapists have the intrapersonal skills needed to be situated problem solvers but perhaps not the interpersonal skills needed to be a skilled communicator.

Implications for Practice

This empirically derived typology resulting from these analyses considerably expands what is known about the nature of critical thinking in respiratory care. Prior to this work, research focused on critical thinking and what it was, and how respiratory therapists assessed their own critical thinking behaviors. This typology has substantial theoretical value, in that it furthers contributes to the mapping of critical thinking in respiratory care.

One a general level, this typology provides empirical support for the notion that there are individual manifestations of critical thinking. As such, the implications of practice based on the findings are that facilitating critical thinking behaviors among respiratory therapists require innovative pre-service teaching and enterprising learning experiences on the job. Further, more emphasis on the importance of experience, expertise, and reflection in professional practice will help facilitate critical thinking. Most clinical learning is acquired on the job and taught informally by preceptors. The goal of educators is to bring this clinical learning and everyday clinical inquiry into the planned educational programs. One proposal to accomplish is to bring into the classroom more ambiguity that is inherent in actual clinical situations that teaches and legitimizes reasoning and coping processes, assists students in developing critical and creative problem solving, and teaches good habits of clinical inquiry and knowledge development directly from practice. (Benner, Stannard, & Hooper, 1996).

In conclusion, the results of this study indicate that respiratory therapists can be distinguished into the two factors: the situated problem solver and the skilled communicator. Further, through cluster analysis, three distinct groups were found, in which the first group was high in both factors, the second group low in both factors and the third high in situated problem solving while low in skilled communication. Gender and years of experience influenced the clusters while age and level of education were not significant. Much can be learned from investigations into particular aspects of critical thinking in the practice of respiratory care that may be applicable to other allied health professions.

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